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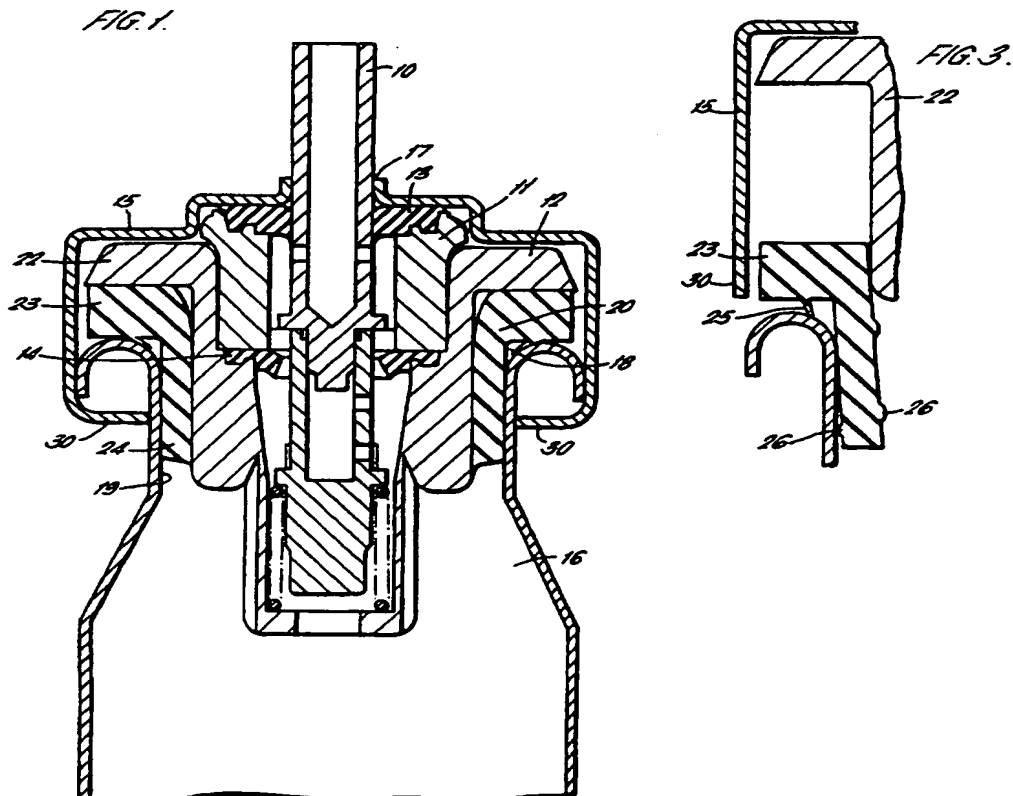
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GB 2307278 A EP 0803449 A1 WO 91/10606 A1  
US 4294410 A US 4251032 A US 3958727 A

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(54) Abstract Title  
Seal arrangement for a pressurised dispensing container

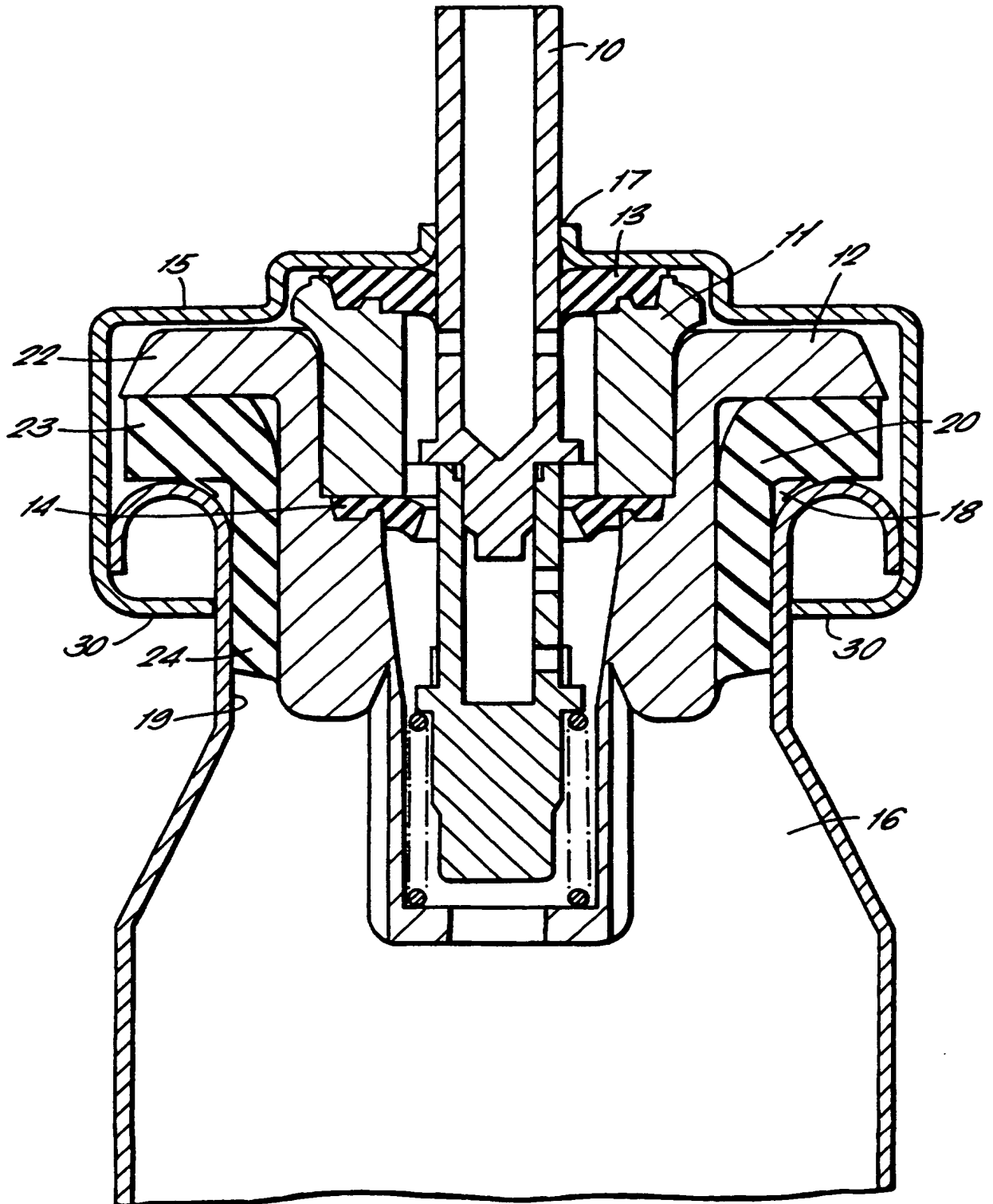
(57) A seal 20 having a gasket portion 23 and a tapered collar portion 24 is in sealing engagement at two separate locations between a valve body 12 of a metering valve and an open end of a container body 16 of a pressurised dispenser. The gasket portion 23 may have a flexible annular sealing rib 25 and seals between a rim 18 of the container opening and a flanged section 22 of the valve body 12. The collar portion 24 may have sealing nodes on its internal and external surfaces seals between an internal surface 19 of the container body and an external surface of the valve body 12.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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FIG. 1.



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FIG. 2.

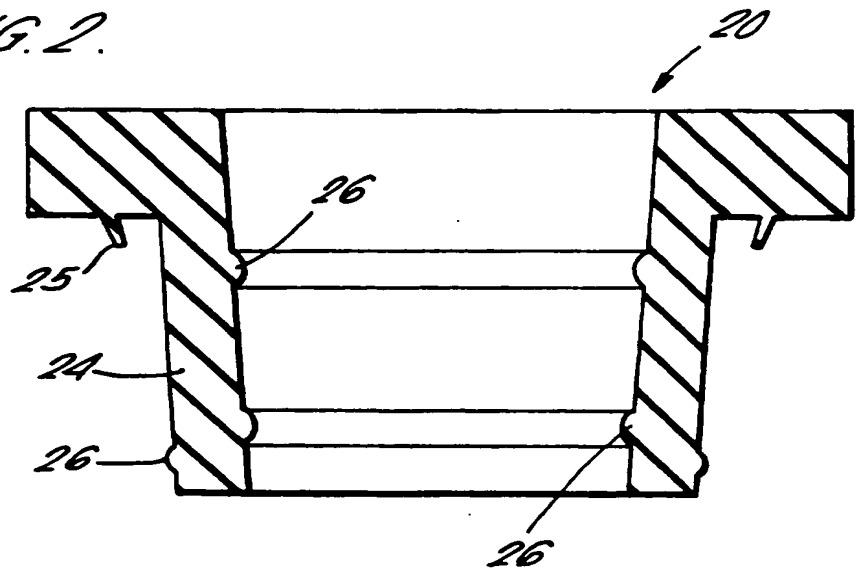


FIG. 3.

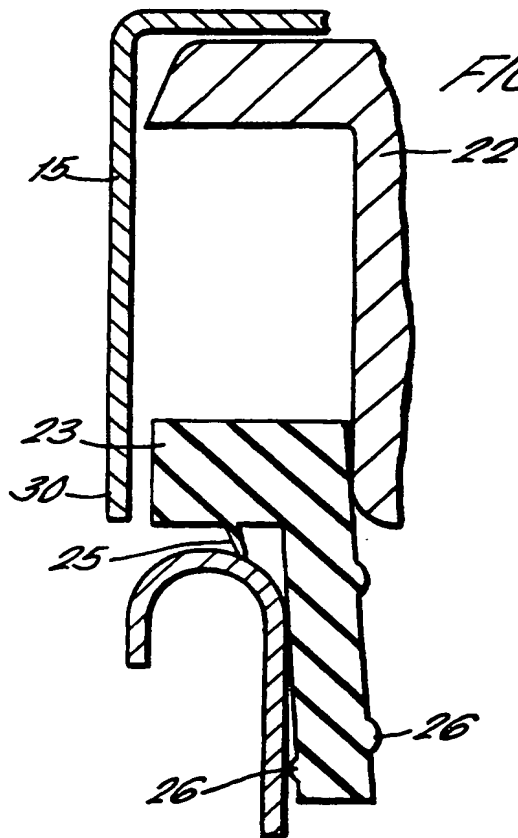
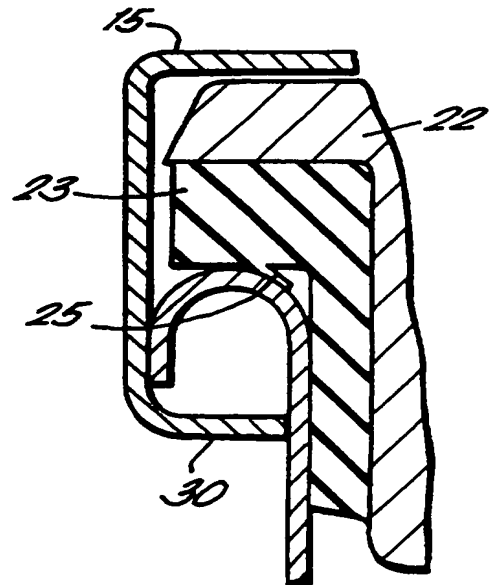


FIG. 4.



IMPROVED SEAL ARRANGEMENTS FOR  
PRESSURISED DISPENSING CONTAINERS

5 The invention relates to pressurised dispensing  
containers with an improved seal arrangement.

Pressurised dispensing containers are used for  
dispensing a wide variety of products from mobile to  
viscous liquid products, powdered products and the  
like and typically employ a liquid propellant such as  
10 a hydrocarbon or fluorocarbon having sufficiently high  
vapour pressure at normal working temperatures to  
propel the product through the dispensing apparatus.  
These are commonly used for dispensing pharmaceuticals  
and medicaments.

15 Generally such pressurised dispensing containers  
comprise a container, a dispensing valve and a closure  
which is crimped to the container to hold the valve in  
place. The primary seal to the container is usually  
in the form of a disc of elastomeric material which is  
20 compressed between the container and the closure to  
prevent leakage. The efficiency of the sealing  
arrangement is particularly important to prevent the  
leakage of propellants from the device and the ingress  
of atmospheric moisture into the container, which may  
25 adversely affect the quality of the product. Although  
such leakage from medicinal aerosols no longer causes  
environmental and safety hazards as the propellants  
used are environmentally friendly, it is important  
that leakage of the contents of the dispensing  
30 containers is minimal to prevent loss of contents  
ensuring that sufficient is available after storage to  
meet label checks and that the ratio of propellant to  
product remains constant.

It has hitherto been a problem that the  
35 deformation of the seal during the crimping operation

can lead to a reduction in the effectiveness of the seal. During the crimping operation, the seal may also be deformed in a manner which does not provide a true seal.

5           It has also hitherto been a problem that the permeability of the seal materials with respect to the propellants has led to loss of propellant during storage of the container and during shelf-life of the product.

10           To overcome such problems it has been proposed to use two seals, both of which are sandwiched between the container and the closure. An example of such proposal is described in International patent specification WO94/25373.

15           An improvement on this arrangement is described in our co-pending application No. GB 9523457.1. In this arrangement a primary seal is located between the container body and the closure, whilst a secondary seal is located between the valve body and the  
20           container.

          In both the above cases the inclusion of a second component is required to enhance the reliability of the sealing system.

          Such systems have been effective in preventing  
25           leakage of propellant. However, in such traditional systems the outer seal or gasket is in the form of a rubber disc and sealing is achieved by compressing the disc across its two flat faces. Thus, the primary seal relies on face compression and this has three  
30           drawbacks. First, the design of such seals means that the length of the leakage or permeation path is relatively short. A shorter path will mean a faster rate at which propellant gas will pass through. Second, the compression on this type of seal is  
35           achieved and maintained by wrapping the ferrule of the

valve around some feature of the container. As the temperature of the system increases the internal pressure rapidly increases with a liquefied propellant system. This has the effect of forcing the valve and container apart, which will reduce the compressive force on the face seal and allow greater leakage of propellant gas or ingress of atmospheric moisture. Thirdly, thermoplastic elastomers suffer a high degree of compression set as compared with, for example, rubber, meaning that they are much less suitable for a face type compression seal.

It is an object of the present invention to provide a further improved sealing arrangement for pressurised dispensing containers.

According to the invention there is therefore provided pressurised dispensing apparatus comprising a container for product to be dispensed, valve means for controlling outflow of product from the container, said valve including a valve body located within the container, said container comprising an open ended container body and a closure fixedly attached to said container body for closing the open end thereof, said closure having an annular sidewall extending around at least an upper end of the container body, said apparatus further comprising a seal located in sealing engagement at least two separate locations between the valve body and the container.

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawing in which:-

Fig. 1 is a cross-sectional elevation of a metering valve known in the prior art for use in a pressurising dispensing container incorporating the composite seal according to the present invention;

Fig. 2 is a cross-sectional elevation of the composite seal of Fig. 1; and

Figs. 3 and 4 illustrate the steps required for closing the container of Fig. 1.

5

Referring to Fig. 1 a metering valve comprises a valve member in the form of a valve stem 10 which is axially slidable within an annular metering chamber 11. The metering chamber 11 and a portion of the valve stem 10 are located within a valve body 12. An  
10 outer sliding seal 13 and an inner sliding seal 14 extend radially between the valve stem 10 and the chamber 11. The outer seal 13 is sandwiched between an upper end of the metering chamber 11 and a closure or ferrule 15 which is crimped to a container body 16  
15 covering an annular opening 18 thereof, thus providing a closed container holding the product to be dispensed. The opening 18 of the container body 16 is, in this example, formed by a downturned rim  
20 (although other configurations are possible). The closure 15 has a central aperture 17 through which the valve member 10 extends. Depression of the valve stem 10 causes the product to exit the container 16 from the chamber 11 through a passageway in the valve stem  
25 10. The specific form and mode of operation of the metering valve may be selected as required.

A seal 20 is located between an internal surface 19 of the upper end of the container body 16 and the external surface of the valve body 12. In the  
30 embodiment of the invention shown in Fig. 1, the seal 20 has a first section provided by a gasket 23 of a relatively hard material. The gasket 23 seals against the rim forming the annular opening 18 of the container body 16. The gasket 23 may also include a  
35 flexible annular rib 25 located on one annular face of

the gasket 23 for sealing against the rim. The other face of gasket 23 is in direct sealing engagement with a flanged section 22 of the valve body 12.

5 The seal 20 has a second section provided by a collar 24 depending from the gasket 23. The collar 24 may be of the same material as the gasket 23 or two different materials may be used which are moulded together. In this way, the gasket 23 may be formed with a greater resistance to moisture ingress and the  
10 collar 24 with a greater resistance to propellant, for example. The bore through the seal 20 defined by the collar is preferably tapered, having a greater diameter adjacent the gasket 23 and a smaller diameter at the other end of the collar 24. Preferably, the  
15 larger diameter end of the bore will have a similar size to the annular section of the valve body 12 whereas the other end of the bore will be significantly smaller than the annular section of the valve body 12. The effect of this is to apply radial  
20 compression to the material of the collar 24 during the assembly operation. The collar 24 is thus in sealing engagement with the internal surface 19 of the container body 16, at a neck portion thereof, and the external surface of the valve body 12.

25 The collar 24 may be provided with deformable sealing nodes 26 on both its internal and external surfaces to provide the sealing engagement. Such sealing nodes 26 may be required depending on the properties of the material used to make the collar 24,  
30 to reduce friction during assembly or to localise compression.

In order to close the open container 16, the seal 20 is placed in the opening 18. The valve body 12 is located within the seal 20 and the rest of the valve  
35 components assembled therein with the closure 15



fitted over the top. The closure 15 initially has straight sides which fit closely over the rim forming the annular opening 18 of the container body 16. The closure 15 is crimped to the container such that the free ends of the side walls 30 are bent underneath the rim of the container 16. As the valve body flange 22 bears down on the gasket 23, the gasket (or the flexible rib 25 if present) comes into contact with the rim and is deformed inwardly to provide a seal against the rim. As the valve body 12 is pushed downwardly inside the seal 20 the nodes 26 are deformed to thereby provide sealing again between the container 16 and valve body 12. This procedure is shown more clearly in Figs. 3 and 4.

The composite seal 20 therefore has no sealing contact with the closure 15. While some face compression of the seal 20 may occur, this is no longer the primary seal area. The primary seal is now the radial seal to the container which results in a reduction in surface area, an increase in path length and minimum effects due to temperature elevation. Additionally it allows the use of harder seal materials such as TPE's or olefins not previously possible with traditional seal arrangements with no compromising of the integrity of the crimped seal.

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CLAIMS:

- 5        1.    Pressurised dispensing apparatus comprising a  
         container for product to be dispensed, valve means for  
         controlling outflow of product from the container,  
         said valve including a valve body located within the  
         container, said container comprising an open ended  
10       container body and a closure fixedly attached to said  
         container body for closing the open end thereof, said  
         closure having an annular sidewall extending around at  
         least an upper end of the container body, said  
         apparatus further comprising a seal located in sealing  
15       engagement at at least two separate locations between  
         the valve body and the container.
2.    Pressurised dispensing apparatus as claimed in  
         claim 1, wherein at least one of the sealing locations  
20       consists of a radial compression seal.
3.    Pressurised dispensing apparatus as claimed in  
         claim 1 or claim 2, in which the seal is made from two  
         or more materials.
- 25       4.    Pressurised dispensing apparatus as claimed in  
         any of claims 1 to 3 in which the seal has a first  
         portion comprising a gasket in sealing engagement with  
         an annular face of a flanged section of the valve body  
30       and a rim forming an opening in the container.
5.    Pressurised dispensing apparatus as claimed in  
         claim 4 in which the gasket is provided with a  
         flexible sealing rib which seals against the rim.

35

6. Pressurised dispensing apparatus as claimed in claim 4 or claim 5 in which the seal has a second portion comprising a collar depending from the gasket in sealing engagement with an internal surface of the container and the valve body.

7. Pressurised dispensing apparatus as claimed in claim 5 in which the collar has deformable sealing nodes on its inner and outer surfaces.

10

8. Pressurised dispensing apparatus substantially as hereinbefore described with reference to and as shown in the accompanying drawings.



Application No: GB 9827401.2  
Claims searched: 1 to 8

Examiner: Robert Crowshaw  
Date of search: 1 March 1999

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.Q): B8N (NKB); F1R (RCC)  
Int Cl (Ed.6): B65D 83/14  
Other:

### Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2307278 A	(BESPAK) Note in figure 4 the seal 220 in sealing engagement in two places between the valve body 12 and the container body 16.	1, 4-7
X	EP 0803449 A1	(BESPAK) Note in figure 1 the seal 14 between the container 11 and two separate faces of the valve body 18.	1, 4-7
X	WO 91/10606 A1	(HOECHST) Note the seal arrangement comprising the gasket 33, which seals between the flange 32 on the valve body 31 and the container 1, and the collar 4 which seals between the valve body 31 and the container neck 13.	1-6
X	US 4294410	(L'OREAL) Note the two lips 14 which seal in two places between the skirt 13 of the valve body and the neck 2 of the container.	1, 2
X	US 4251032	(WERDING) Note in figure 6 the separate sealing locations of the rubber tube 11 between the annular ribs 9,10 on the valve body and the container 18.	1, 2

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.



Application No: GB 9827401.2  
Claims searched: 1 to 8

Examiner: Robert Crowshaw  
Date of search: 1 March 1999

Category	Identity of document and relevant passage	Relevant to claims
X	US 3958727 (VCA) Note in figure 1 the skirt 42 of the valve body which seals within the container neck 12, and the flange 38 of the valve body which seals against the container rim 15.	1, 2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.